AB-227

REPORT ON STUDIES CONDUCTED

IN COMPLIANCE WITH CONDITION 21

OF THE PUTNAM PLANT SITE CERTIFICATION

Prepared for

FLORIDA POWER & LIGHT COMPANY

MIAMI, FLORIDA

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By

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ATLANTA, GEORGIA

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INTRODUCTION

This report describes studies conducted to assist the Florida Power & Light Company in its compliance with Condition 21 of Putnam Plant Site Certification No. PPS-74-01. Condition 21 states, in part, that 1) no debris shall be discharged to waters of the State from the intake screens with the exception of viable nekton, and 2) a study will be undertaken to evaluate methods of returning viable nekton collected on the intake screens to ambient temperature waters.

Nekton are defined as organisms of large size (relative to plankton) that swim freely and do not depend upon the movements of the surrounding water. Fish, crabs, and shrimp are the typical nekton in the vicinity of the Putnam Plant.

To comply with Condition 21, this study was designed to determine the amount of viable nekton that becomes impinged on the intake screens, and to evaluate methods of returning this nekton to ambient temperature waters.

DESCRIPTION OF PLANT AND COOLING WATER INTAKE SYSTEM

The Putnam Plant is located on the east side of the St. Johns River near East Palatka, Putnam County, Florida (Figure 1). The combined cycle units of the plant have a total generating capacity of 520 megawatts gross and consist of a gas turbine portion and a steam generator portion. The gas turbine portion of the units does not require cooling water. Closed cycle cooling water for the condensers of the steam generator portion of the units is provided by a six-cell mechanical draft cooling tower.

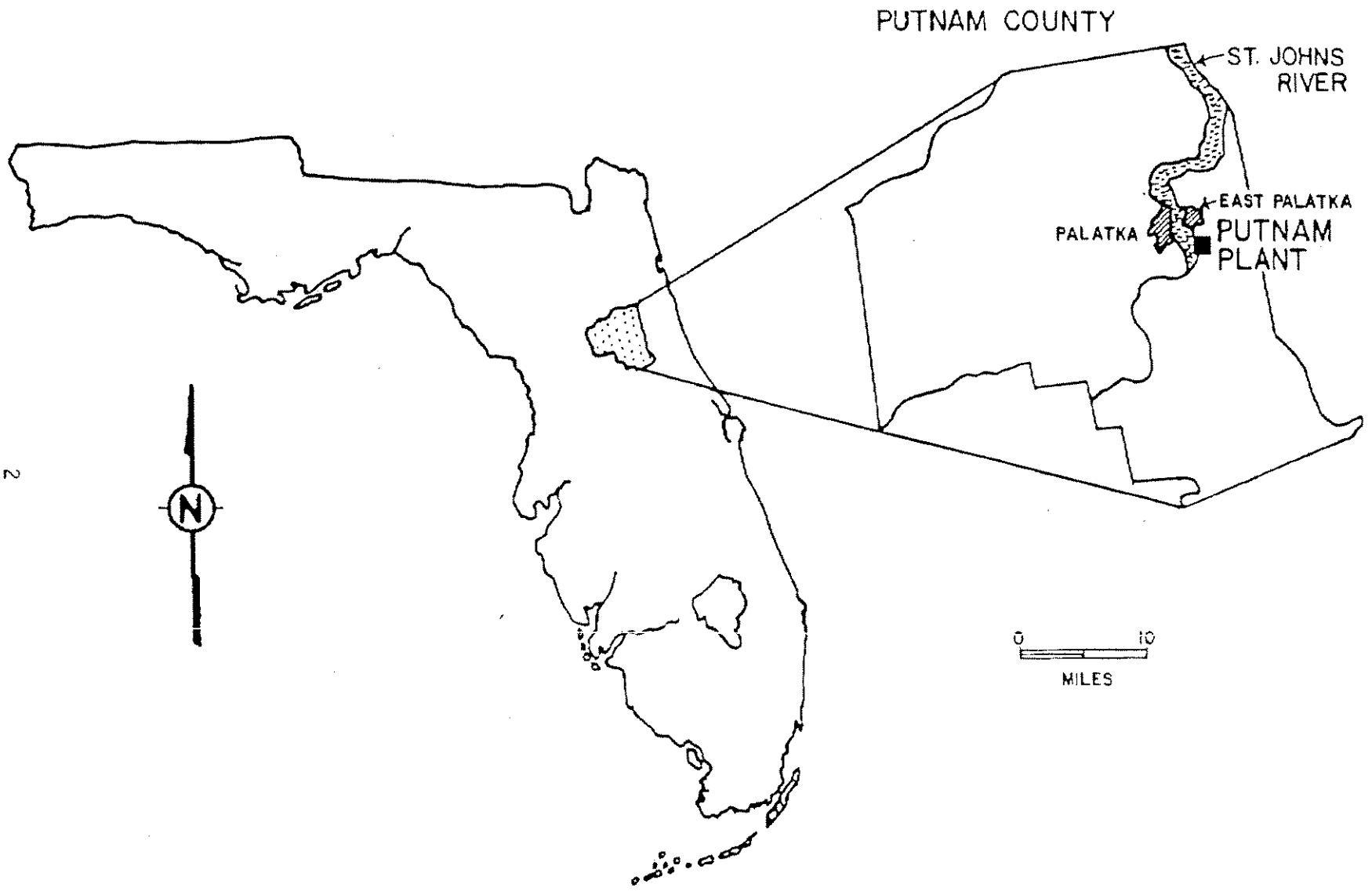

Figure 1. Location of the Putnam Plant, East Palatka, Putnam County, Florida.

Makeup water is required at the Putnam Plant to replace cooling water lost to evaporation and blowdown from the cooling tower. This makeup water is drawn from the St. Johns River through an intake basin and structure located near the plant's south property line (Figure 2). The intake basin is about 30 feet wide and has an average depth of about 9 feet. A floating boom extends across the intake basin to keep floating debris from entering the intake.

Two pumps are located on the intake structure (Figure 3). Makeup water is drawn from the intake basin through bar screens, or "grizzlies" (1 5/6-inch opening), which catch any large debris. This debris is removed with a trash rake mechanism, placed in a large container, and hauled away as necessary. After passing through the bar screens, the makeup water passes through the vertical traveling screens (3/8-in^2 mesh) which collect small debris and nektonic organisms. This material is washed off the traveling screens and passes through a wash trough and into a trash container. The purpose of the screening (floating boom, bar screens and traveling screens) is to prevent materials from entering the pumps and cooling tower.

Under normal operating conditions, only one makeup-water pump is operated at a time and the average water flow (volume) is 4500 gallons per minute. Water velocity is 0.01 feet per second (fps) or less in the intake basin, 0.18 fps through the bar screens, and about 0.25 fps through the traveling screens. After passing through the traveling screens, the cooling water enters the pump wells, the makeup-water pumps and then a pipe to the cooling towers. A complete description of the

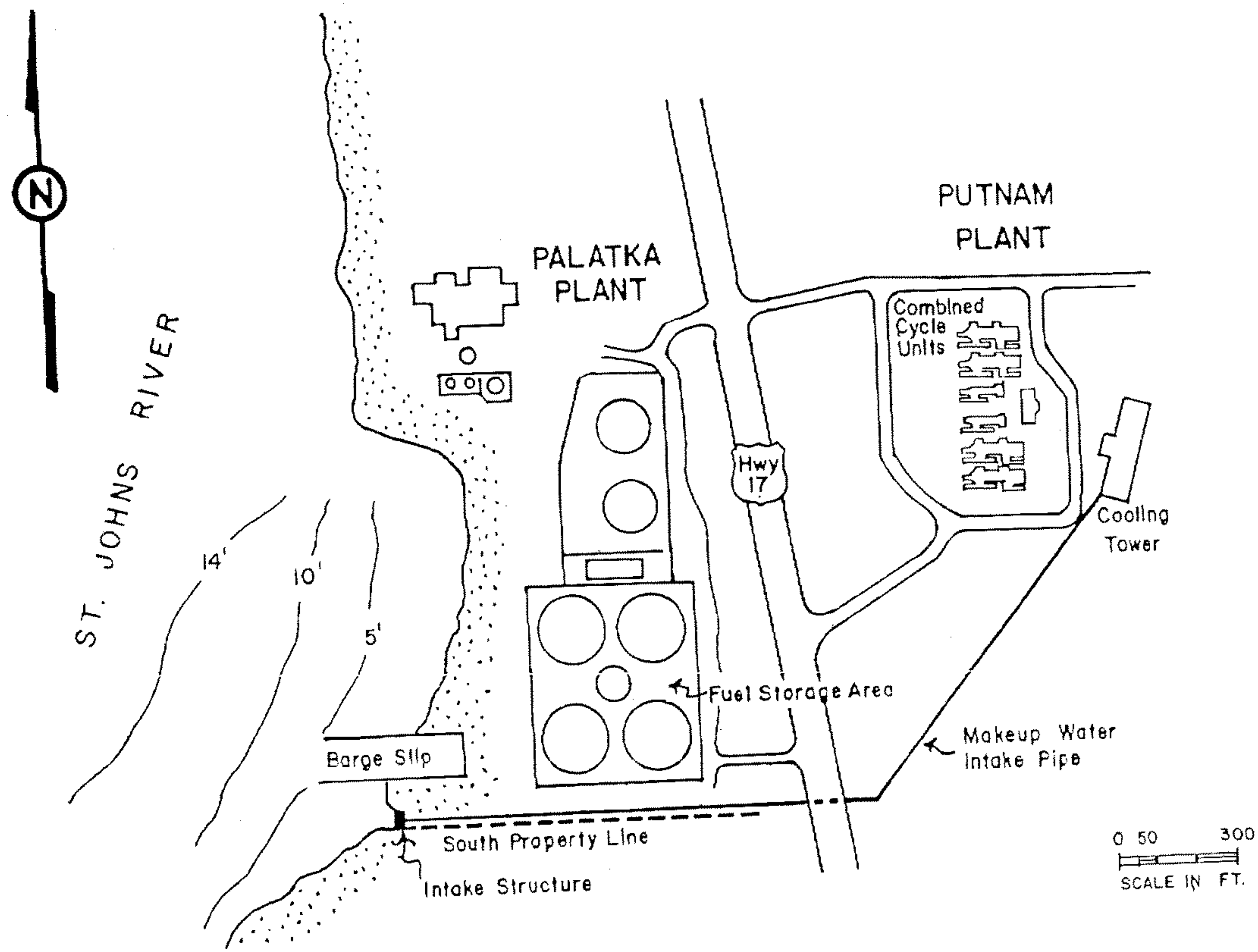

Figure 2. Diagram of the Palatka and Putnam Plants on the St. Johns River.

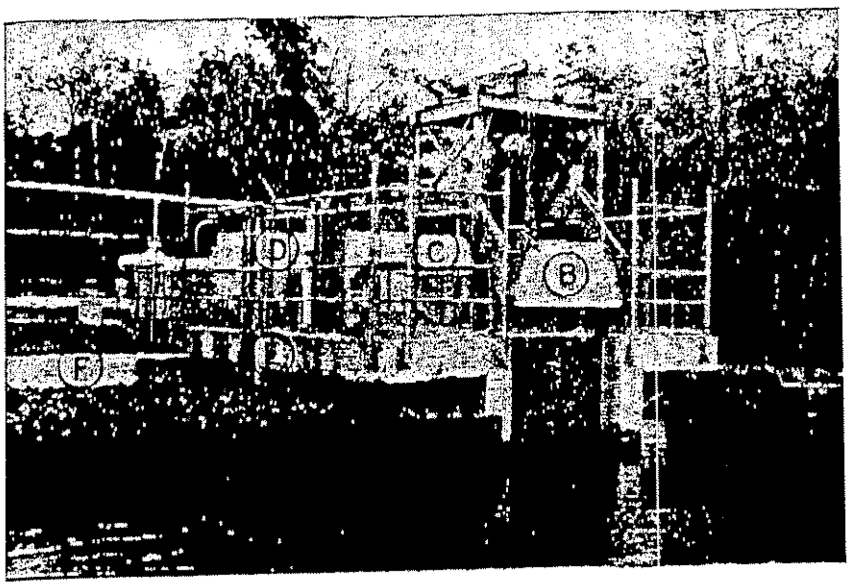

Figure 3. Intake structure at the Putnam Plant. A) bar screens, B) trash rake for the bar screens, C) housing containing the traveling screens, D) housing containing the pumps, E) mouth of wash trough from the traveling screens, and F) trash container (water hyacinths covered the water surface of the trash container when this photo was taken in October 1979).

Putnam Plant's cooling water intake system was provided by R. L. Lyerly & Associates (1977).

MATERIALS AND METHODS

Impingement samples were collected on 9-11 April and then on a weekly basis from 30 April through 11 September 1979. These months were selected for sampling because maximum fish, shrimp and blue crab impingement had been recorded during this time at the adjacent Palatka Plant (ABI, 1976).

Each collection consisted of those organisms impinged during a 24-hour period. For each sample the traveling screens were washed, left in place for 24 hours and then rewashed. During the final washing, a 3/8-in^2 mesh screen was placed across the wash trough from the traveling screens (Figure 3) to collect any impinged nekton. Impinged organisms were identified to species, counted, measured to the nearest millimeter standard length for fishes and carapace width for crabs, and weighed to the nearest gram.

RESULTS AND DISCUSSION

Twenty-five (25) impingement samples were taken from 9 April through 11 September 1979 (Table 1). Sampling time was 13.7% of the total time pumps were operating during the months of April through September (25 sample days/183 total days).

During the entire period, only two nektonic organisms were collected (Table 1). These were partially decomposed and were probably dead prior

TABLE 1

SAMPLING DATES AND NEKTON COLLECTED
DURING IMPINGEMENT SAMPLING
PUTNAM PLANT
9 APRIL - 11 SEPTEMBER 1979

Date		Nekton collected
Apr	9-10	none
	10-11	none
	11-12	none
	31 - 1 May	1 white catfish (180 mm, 78 g) 1 blue crab (80 mm, 15 g)
May	9-10	none
	14-15	none
	21-22	none
	29-30	none
Jun	4-5	none
	11-12	none
	12-13	none
	18-19	none
	19-20	none
	25-26	none
Jul	2-3	none
	9-10	none
	10-11	none
	16-17	none
	23-24	none
	30-31	none
Aug	13-14	none
	20-21	none
	27-28	none
Sep	5-6	none
	10-11	none

to being impinged. In addition to the absence of viable nekton, there was almost no debris, such as leaf litter, aquatic vegetation or other materials usually found on intake screens.

To determine why no viable nekton were found, water flow characteristics and impingement data from a previous study at the adjacent Palatka Plant were examined. At the Palatka Plant, average daily impingement was only 125 fish[a], 70 shrimp and 30 blue crabs (ABI, 1976). Intake cooling water volume at the Palatka Plant was 83,350 gallons per minute, or 18.5 times that of the Putnam Plant. Similarly, intake water velocity through the traveling screens was 1.03 fps (Unit 1) and 1.79 fps (Unit 2) at the Palatka Plant as compared to only 0.25 fps at the Putnam Plant. Impingement rates at the Putnam Plant could thus be expected to be low. The lack of any viable nekton being impinged at the Putnam Plant may be due to the very low intake water volume and velocity and/or to causal factors such as intake morphology in relation to the shoreline, proximity of river currents, and water depths in the general intake vicinity.

SUMMARY AND CONCLUSIONS

An impingement study conducted at the Putnam Plant cooling water intake during the months of April through September 1979 showed that no viable nekton and only small amounts of debris were being removed from the St. Johns River by the intake traveling screens.

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[a]Exclusive of a "run" of juvenile threadfin and gizzard shad which occurred on one occasion.

In compliance with Condition 21 of Putnam Plant Site Certification No. PPS-74-01, 1) no debris has been or will be discharged to waters of the State from the intake screens, and 2) there was no viable nekton found. A study to evaluate methods of returning viable nekton from the intake screens to ambient temperature waters would not be applicable to the Putnam Plant intake.

LITERATURE CITED

ABI. 1976. Ecological parameter monitoring at the Palatka Plant. Prepared by Applied Biology, Inc. for Florida Power & Light Co., Miami.

R. L. Lyerly & Associates. 1977. A description of the cooling water intake system of the Putnam Plant. Report to Florida Power & Light Co., Miami. 16 pp.